every where with resistance, the air, according to the common notion, pressing equally upon it from all sides, and preventing that extension which it acquires on the surface. The air, then, presents a surface, wherever it rests upon, or leans against, any body or substance. Thus, when cannons are fired at sea, it is not the water that conveys the sound to an extraordinary distance, but the surface of the air resting on the water; when the tramping of horses is heard at a greater distance by putting the ear close to the earth, than it is in, or through, the body of the air, it is not the earth that conveys the sound, but the surface of the air resting on it; when the end of a beam of timber is scratched with a pin or nail, or gently knocked upon, it is not the wood or the beam that conveys the sound to the other end, but the surface of the air surrounding the beam, the surface round the beam forming one ring all over, and bringing it into one focus at the opposite end; hence the appearance, as if the sound had come through the beam itself. It is the same with a poker struck against any substance to produce a sound: it is not the poker that conveys the sound to the ear held close against it, but the surface of the air by which it is surrounded: the poker, like other solid substances, does not convey the sound, but gives it only its quality. I do not know whether they even may be called conductors, inasmuch as for conveyance they are entirely passive.

If in the whispering gallery of St. Paul's you speak across, you will not be heard on the opposite side, because the sound produced cannot travel the distance, meeting every where with resistance; but speak close to the wall, and the ring produced on the surface of the air resting against it will immediately carry the sound all round, there being no resistance or impediment. It is not the wall that conveys the sound, but the surface of the air resting against it. Hence it follows, that the smoother and harder the surface of the substance against which the air rests, the better will sound be conveyed. On the contrary, like the ring on the water, if on its surface you place a sponge, the sponge will absorb the ring; if you hang the wall with a soft, porous substance, woollen cloth or the like, the ring of the air will be absorbed, and the sound propagated no farther.

W. Adolph.

PROPOSED SCHOOL OF CONSTRUCTION FOR ENGINEERS.

In consequence of the dissolution of Putney College, Mr. Clegg, jun., proposes to establish a school for the purpose of preparing gentlemen about to enter the profession of civil engineers or architects, for the duties of the office and for field-work; to give them a knowledge of the principles of construction, and the methods of drawing structures for the use of artificers, and thus to render them useful, when articled; to prepare them to understand the reasons for the various dimensions and dispositions of material which they will find in works intrusted to their partial charge, and so to learn practically what they have been previously taught theoretically. The instruction is proposed to be given under two divisions: the first for gentlemen becoming students without previous acquaintance with the subjects; and the senior division for gentlemen who have gone through the courses of instruction in the applied sciences at a college. He gives the following as an outline of the course of instruction to the—

Junior Division.—Third Class.—The nature and properties of bricks, stones, mortars, cements, timber, cast-iron, wrought-iron, and the materials used in construction. The methods of applying materials in work separately and together; the effects of position; strength of material. Rules for determining dimensions. The mechanical powers, and their application to moving and hoisting great weights. Strength of ropes, chains, &c. Cranes, scaffolding, &c. Retaining and breast walls, and the natural slopes of soils, &c. Square and oblique arches, domes, and vaults. Roofs of timber and iron, floors, and fire-proof buildings. Centering. Bridges of timber, brick, stone, and iron, their site, approaches, the span and figure of the arch: circumstances regulating the choice of materials. Common and trigonometrical surveying. Levelling and setting-out work. Mechanical drawing, plotting of surveys and sections, perspective, and the projection of shadows, will be taught at proper intervals throughout the course.

Second Class.—1. *Natural and artificial foundations* on land and in hydraulic works:—concrete, béton, timber piling, coffer-dams, the screw pile, pneumatic cylinders, &c. 2. *Roads and Railways.*—Physical laws which have to be considered in establishing their routes. Theory of gradients. Formation of their surfaces. The works connected with them, as earthwork, fences, drains, culverts, bridges, viaducts, tunnels, stations, &c. Drainage of earthwork, and slips. Estimating quantities, construction of prices, specifications, and working drawings. The various detail works mentioned in the third class are considered in position, and working drawings, estimates, and specifications are made for them. Setting-out curves and side-widths; levelling for gradients, and the more intricate operations of field-work connected with setting-out the positions of bridges, &c., establishing bench-marks from which to measure their proper heights, &c., are practised.

First Class: *Draining lands, and reclaiming districts from water.* Machines used.—*Drainage of Towns and Buildings.*—*Water-works:* the sources of supply. Reservoirs: distribution. Theory of the discharge of fluids through pipes. Intermittent and high-pressure systems. Water supply for detached houses.—*Well-sinking and boring.* Artesian wells.—*Gas-works:* subjects taken from Mr. Clegg's work on the "Manufacture and Distribution of Coal-Gas," the improvements that have been made since its publication being noticed. Works connected with the sanitary condition of towns, &c. *Canals, and the improvement of Rivers.*—General laws determining the point where river navigation should end, and where canals should commence. Choice of route for canals. Feeders, reservoirs, summit level, locks, cross-section. River work: operations before deciding on means of improvement. Origin of shoals and bars. The effects of weirs, embankments, &c. on the channels of rivers. Dredging: excavating rocks. Blasting under water. Diving-bell. *Harbours and Docks.*—Effects of tides and waves upon a line of coast. Groynes, sea defences, breakwaters, the positions of harbours of refuge. Tidal harbours, piers, jetties. Docks, dock entrances and gates, effects of backwater. Surveys connected with hydraulic works. Coast surveys. Soundings. Making plans and sections of rivers. *Beacons, Floating Lights and Lighthouses.*—Choice of position, construction of towers, stone, metal and timber. The modes of lighting and arrangement of reflectors and refracting lenses.

ARBITRATION FOR LAND BETWEEN RAILWAYS.

An important arbitration was decided on Wednesday week at the Shirehall, Gloucester, in which the Great Western and the Midland were the railway companies interested. The subject-matter in dispute was the price to be paid to the Great Western Company for the land by the side of their line which is required by the Midland Company for carrying out, under their Act of 1848, the construction of a narrow gauge line between the city of Gloucester and the termination of their line at Stonehouse. In fact, it involved the carrying out of an unbroken narrow gauge line from the north through Birmingham and Gloucester as far west as Bristol.

Mr. Talbot, for the Great Western, set out by expressing the unwillingness of the company to give up the land in question, which, however, was about to be forced from them by an Act of Parliament. The Great Western Company were there for the jury to fix the price of several pieces of land on the side of their rails, containing 22a. 3r. 28p. and lying along the line between this city and Stonehouse-bridge; and also to obtain compensation for the damage they should sustain by reason of the carrying out of an Act of Parliament obtained by the Midland Company for the laying down of a new line. The question the jury would have to try was by no means confined to the physical abstraction of the land, but it likewise embraced compensation to the party for the injury and loss he sustained by reason of the abstraction of the land against his will. Mr. Talbot then entered into some narrative details, and proceeded to state that the Midland Company had offered for the purchasing of these 23 acres of land 4,600*l.*; and for the damage the sum of 1s. The average cost price of land for railway purposes throughout the kingdom was about 200*l.* per acre, and therefore the 4,600*l.* would be about the value of the land to be taken; but he contended at length that the Great Western Company, having had to pay a per centage on their purchase-money for a forced sale, and this being a forced sale likewise, that therefore the Midland Company ought also to pay a per centage for a forced sale above the total cost of the land to the Great Western Company. Mr. Talbot then contended that the Midland Company ought to pay for that portion of the works, such as the embankments, cuttings, &c., which they might take, and which would be so much of their work done, and also that a per centage should be fixed upon the price fixed for these works, this being also a forced sale. He also stated that the bringing of the new line within the 5 feet boundary of the Great Western Company's westernmost rail was as close as it could be brought with safety to the public, and would not allow even room for the signal man between the carriages. He likewise claimed compensation for the loss of the capability to make sidings on the western side of their line (which would be necessary when they obtained the mineral and increased agricultural traffic which he considered would result from the opening of the South Wales lines), and also for the loss of the power for landowners to make private lines approaching the railway, and for constructing of bridges, &c. Mr. Talbot spoke of a minute of an agreement drawn up in 1842, by which the Midland was to pay 60 per cent. of the tolls arising on this part of the line for travelling over it, but this agreement was not executed, and its terms were subsequently altered, to the payment of an annual rent of 11,000*l.* for twenty years, of which period six and a-half years had expired. When the Act empowering the Midland Company to lay down their line was passed, the Government made it binding that this annual rent should be continued till the end of the term; and it was now insisted that at the expiration of that time, if the payment of the annual rent was discontinued, the Midland Company would have to return to their old agreement of paying 60 per cent. out of the accruing tolls.

Amongst the witnesses then called on the part of the Great Western Company were Mr. Hall, of Cirencester, surveyor, Mr. Brunel, and the secretary, also Mr. Jellicoe, actuary to the Eagle Assurance Society, the last of whom stated that he had calculated what would be the present value of an annuity of 9,000*l.* a year (an amount of loss attested previously), accrueable at thirteen years; it would be 93,206*l.*: twenty-three acres at 200*l.*, 4,600*l.*; 30 per cent. for compulsory sale, 1,380*l.*; cost of works, 7,966*l.*; 30 per cent. for compulsory sale, 1,593*l.*; loss of side lines, 5,000*l.*; loss of communication with landlords, 3,000*l.*; together (without the annuity), 23,539*l.*

Mr. Alexander, Q.C., then replied on behalf of the Midland Company. He dilated on the nature of the claim which the Great Western had set up, and that although they were now receiving on this piece of line alone 9,500*l.* a year profit, and would continue to receive 11,500*l.* a year profit after the new line was made until the end of the period of twenty years, yet that they should have brought Mr. Jellicoe there to estimate the per-centage reversion at the end of that period at 93,000*l.* He contended that the real objection to the sale arose from an apprehension of loss of traffic. The minute of the agreement of 1842 he contended was incorporated in the binding agreement of 1843; but if the Great Western Company thought proper to try the question of the receipt of the 60 per cent. of the tolls accruing to the Midland Company on this part of the line, they could do so at the expiration of the present agreement.

In summing up, the learned Assessor gave his opinion that the present was not the time or place for that question to be considered, and the jury agreeing in this opinion, at the request of the counsel on either side, it was withdrawn. Mr. Whitmore then explained the other parts of the claim; and

The jury found a verdict for 2,500*l.* for the land, and 3,000*l.* damages.

[For a pretty full report of this case we may refer to the *Gloucester Chronicle* of the 16th inst.]

Iron Monument.—In the Baptist Chapel at Jamaica is a monument in iron to an apostle of negro emancipation — the Rev. William Knibb. It is to be erected on a column or flight of three stone steps, the base of which will be fourteen feet, the second eleven, the third ten, and upon which will rest the base of the ironwork of the monument. The monument itself is formed by four square plates of iron, and there are four iron columns at the corner of each square, supporting an iron plate, on which rests an urn, with the figure of a flame issuing therefrom.

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